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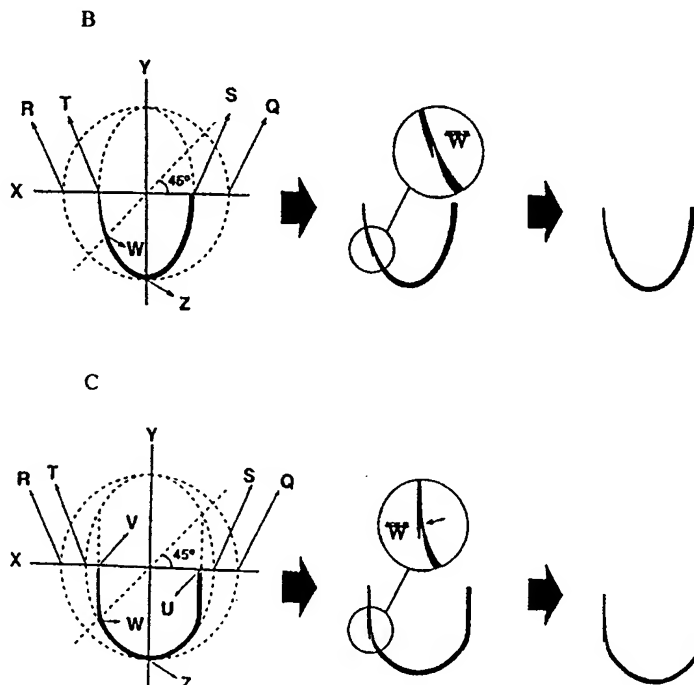
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/KR97/00205 <b>(22) International Filing Date:</b> 29 October 1997 (29.10.97) <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> OH, Nahm-gun [KR/KR]; Pusan National Uni. Hospital, Dept. of Surg., 10, Amidong, Suhgu, Pusan 602-739 (KR).		<b>(81) Designated States:</b> AU, CA, CN, IL, JP, US, UZ, Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i>

**(54) Title:** SUTURE NEEDLE**(57) Abstract**

A half-ellipse-shaped suturing needle or a U-shaped suturing needle for posterior bowel wall sutures, as well as a special barb feature on the suturing needle tip for anterior wall sutures. With both needles, the distance between the ends is shorter than those of the common half circle needle. This allows the submucosa ipsilateral from the needle holder to be safely stitched without any submucosal tearing during an entire Gambee suture of the posterior bowel wall from one fixed grasp of the needle holder. The fishing hook-shaped barb for the suturing needle tips keep the submucosa contralateral from the fixed grasp needle holder from slipping-off of the needle during an entire Gambee suture on the anterior bowel wall. As a result, this design allows for all the handling necessary in an entire Gambee suture on posterior or anterior bowel wall from one-fixed grasp of the needle holder.



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**【 DESCRIPTION 】****【 Title of Utility 】** SUTURE NEEDLE**【 Technical Field 】** Suturing needles for bowel anastomosis

**【 Background Art 】** It is commonly accepted that the Gambee suture is a precise and reliable suturing method in the anastomosis of the intestine, especially in the aspect of the exact apposition of the submucosal layer, which has the greatest tensile force among the multiple layers of the bowel wall. Generally, a half-circle shaped needle has been utilized in Gambee suturing.

The first problem of the commonly used half-circle needle occurs during an entire Gambee stitch on the posterior bowel wall from one fixed grasp of the needle holder. Here, the submucosal tissue ipsilateral from the needle's eye can be easily torn, since the distance between both ends of a half-circle needle is usually longer than the longitudinal length of the submucosal tissue to be sutured.

Furthermore, the second problem of a commonly used half-circle needle occurs during an entire Gambee suture on the anterior bowel wall from one fixed grasp of a needle holder. Here, the submucosa contralateral from the needle holder usually slips off the needle, because the direction of the suturing needle tip changes with each step and is critically reversed from the third step stitch to the fourth step of an entire Gambee suture. This situation can result in an incomplete and inappropriate Gambee suture of the anterior bowel wall.

Consequently, an entire Gambee suture of the posterior or anterior bowel wall needs at least two or three different fixed grasps of the half-circle needle with the needle holder. Thus, the half-circle needle requires of operators much time and effort, as well as complicated actions and skills. For this reason, the Gambee suture is avoided by many surgeons.

### 【 Disclosure of Utility 】

I have devised a half-ellipse-shaped suturing needle and a half-running-track-shaped suturing needle which allow an operator to perform an entire Gambee stitch of the posterior bowel wall from one fixed grasp of the needle holder. The half-ellipse needle(SZT) resembles one half of an ellipse, which is expressed as  $X^2/S^2 + Y^2 = 1$  ( $0.5 < S < 0.75$ ). The half-track needle(U#ZWV) resembles the aforementioned half-ellipse needle on the two convex side quarters, but its two terminal quarters are straightened parallel to its longest diameter(Y-axis). With both needles, the distance between the ends(ST in half-ellipse, or UV in half-track) becomes shorter than the longitudinal submucosal length(A-GH) of the posterior bowel wall to be sutured ipsilateral from the needle holder. Thus, submucosal tearing can be prevented, even in the case of an entire Gambee suture from one fixed grasp of the needle holder.

I have also devised a special fishing hook-style barb feature(W) for all suturing needle tips, which allows an operator to perform an entire Gambee stitch of the anterior bowel wall from one fixed grasp of the needle holder. Here, the barb keeps the submucosal tissue of the anterior bowel wall contralateral to the needle holder from slipping off the needle(N→M). The barb does not interfere with the intended directional movement, but prevents the undesirable slipping-off of the submucosal tissue. As a result, the submucosal tissue contralateral from the needle holder can be stitched firmly.

### 【 Brief Description of Drawings 】

Figure 1 indicates my design for the half-ellipse suturing needle,

Figure 2 indicates the modified design of the half-track suturing needle,

Figure 3 indicates the additional barb feature for all suturing needle tips,

Figure 4 shows the practical application of the Gambee suture.

Each detailed portion is illustrated as.

SZT : Half-ellipse shape, U#ZWV : Half-running-track shape.

₩ : Fishing hook-style barb feature for all suturing needle tips.

ABCDEFGH : Sequence of Gambee suture on posterior bowel wall.

IJKLMNOP : Sequence of Gambee suture on anterior bowel wall.

A↔GH : Vulnerable to the submucosal tearing.

N→M : Vulnerable to slip-off of the submucosa.

### 【 Modes for Carrying Out the Utility 】

My half-ellipse suturing needle and half-track suturing needle can be used in a Gambee suture for a posterior bowel wall anastomosis(ABCDEFGH). Using these needles, operators can perform all the handling needed for a posterior bowel wall Gambee suture from one fixed grasp of the needle holder without tearing of the submucosa(A↔GH).

A special barb feature on the tip of the half-circle, half-ellipse, or half-track needle allows for an entire Gambee stitch of the anterior bowel wall(IJKLMNOP) from one fixed grasp of the needle holder, since this barb can prevent slip-off of the submucosa(N→M) contralateral from the needle's eye.

**[ Industrial Applicability ]**

With my half-ellipse needle and half-track needle as well as my barb-tip needle feature, operators can save a lot of time and effort formerly required by other common needles in a Gambee suture. My suturing needles need only one fixed grasp of the needle holder when performing an entire Gambee suture for bowel anastomosis. The half-ellipse needle and half-track needle can prevent submucosal tearing of the posterior bowel wall, owing to the short distance between the ends. My barb feature on the suturing needle tips prevents slip-off of the submucosa contralateral from the needle holder during an entire Gambee stitch on the anterior bowel wall. Consequently, my suturing needles allow for an entire Gambee suture from one fixed grasp, while the common half-circle suturing needle requires at least 2 or 3 different grasping positions of the needle holder.

**【 Claims 】****【 Claim 1 】**

1. The half-ellipse suturing needle(SZT curve) resembles one half of an ellipse which is expressed as  $X^2/S^2 + Y^2 = 1$  ( $0.5 < S < 0.75$ ). This needle has a shorter distance between its ends(S-T) than a common half-circle needle(Q-R), and thus can prevent tearing of the submucosa ipsilateral from the needle holder(A-GH) during an entire Gambee stitch on the posterior bowel wall.

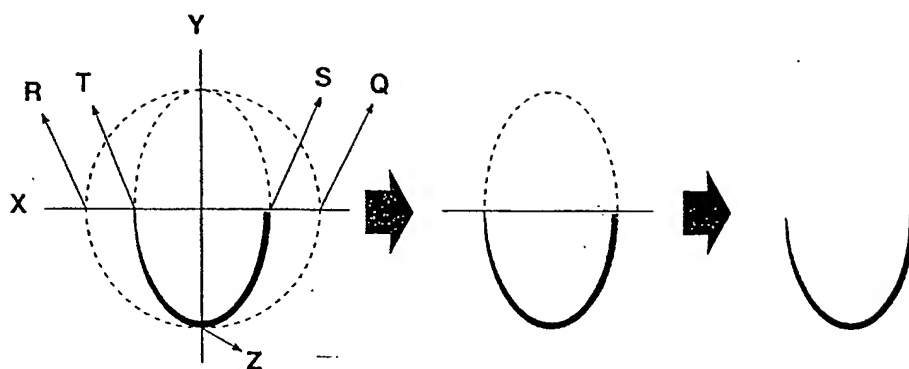
**【 Claim 2 】**

2. The half-track needle(U#ZWV curve) resembles the above half-ellipse needle(Claim 1) on the two convex quarters(#ZW curve), but its two terminal quarters(U# and VW) are straightened parallel to its longest diameter(Y-axis). This needle also has a shorter distance between its ends, so that one fixed grasp of the needle holder allows for an entire Gambee stitch on the posterior bowel wall.

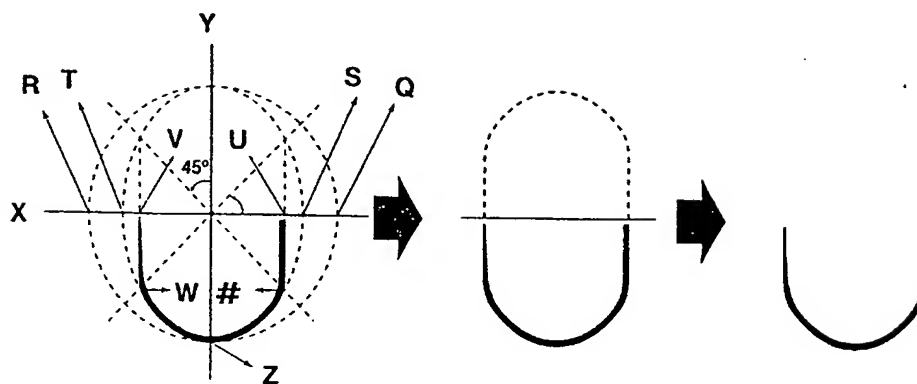
**【 Claim 3 】**

3. The special fishing hook-style barb feature(W) is located near the mid-portion of the tapering distal half of both suturing needles(An additional feature to claim 1 and 2). This barb, which is applicable to all suturing needles including a commonly used half-circle needle, does not interfere with the intended directional movement, but prevents the undesirable slip-off of the anterior wall submucosa(N→M) contralateral from the needle holder during an entire Gambee stitch.

[ Fig. 1 ]

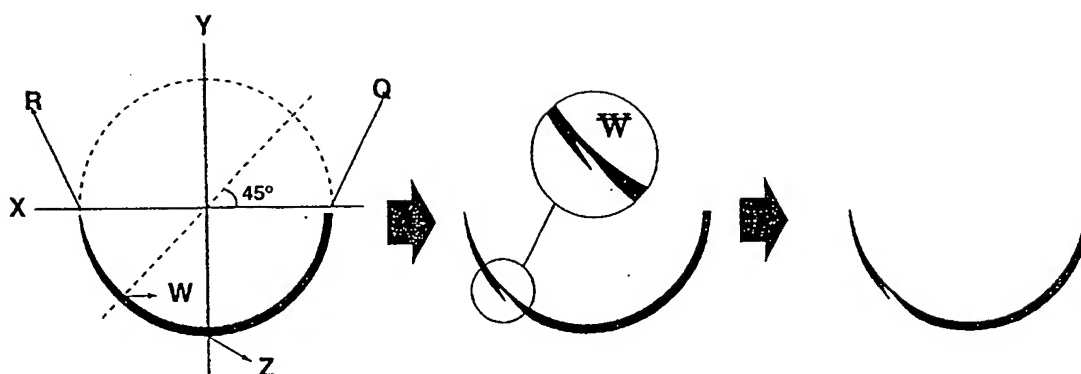


[ Fig. 2 ]

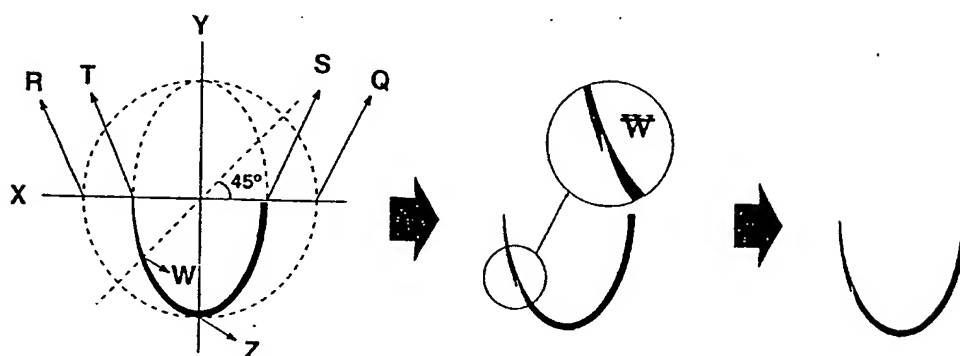




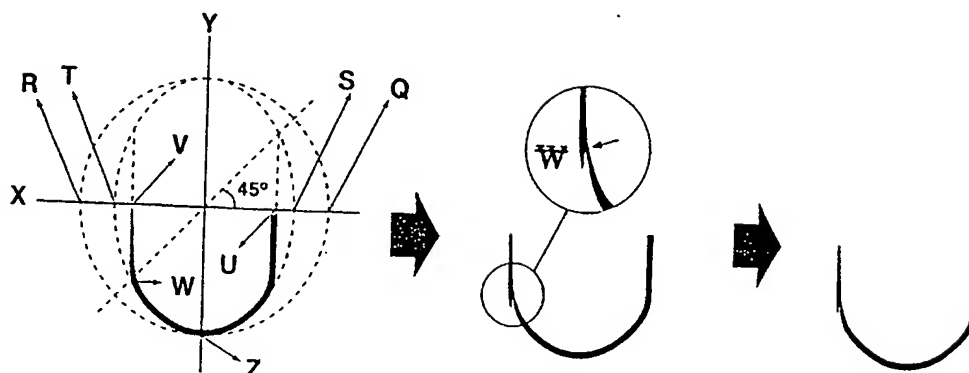
【 Fig. 3-A 】



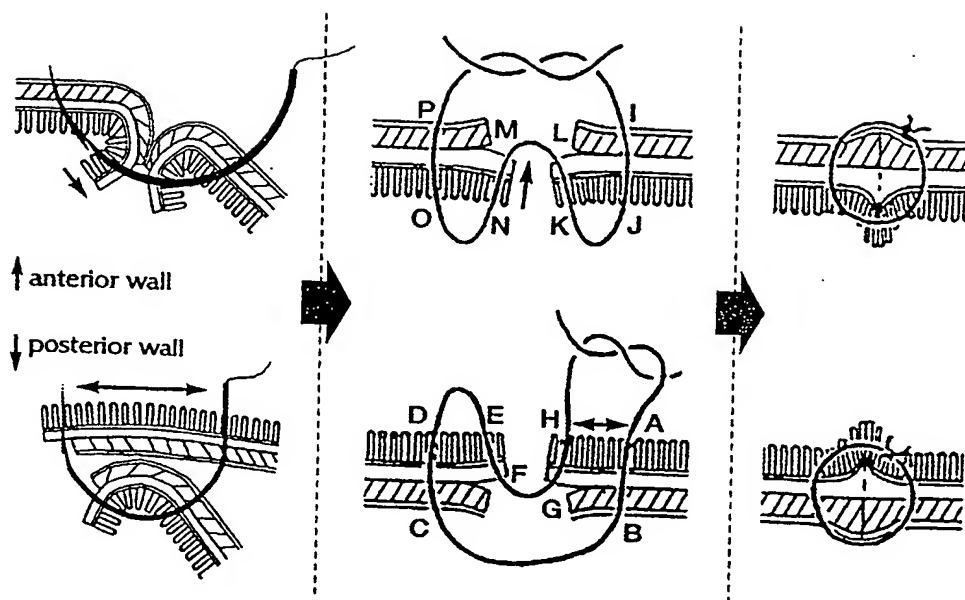
【 Fig. 3-B 】



【 Fig. 3-C 】



【 Fig. 4 】



# INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR 97/00205

## A. CLASSIFICATION OF SUBJECT MATTER

IPC<sup>6</sup>: A 61 B 17/06

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC<sup>6</sup>: A 61 B 17/04, 17/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 059 207 A (M.SHAH) 22 October 1991 (22.10.91),	2
A	fig.3,6,8; abstract.	1
A	EP 0 216 538 A1 (MICRA LTD.) 01 April 1987 (01.04.87),	3
	fig.6b; page 4, line 25 - page 5, line 4.	
A	WO 86/03 396 A1 (F.FRANCA) 19 June 1986 (19.06.86),	3
	fig.3,4,7; claims 1,2.	
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☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search

18 August 1998 (18.08.98)

Date of mailing of the international search report

26 August 1998 (26.08.98)

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# INTERNATIONAL SEARCH REPORT

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The document US 5 059 207 A relates to surgical needles having an U-shaped body (fig.3,6,8) for suturing deep wounds in laparoscopic procedures.

The document EP 0 216 538 A1 relates to a curved surgical needle (ad fig.6b) having a hook-shaped notch (10) adjacent its distal end.

The document WO 86/03 396 A1 relates to curved surgical needles comprising a plurality of hook means distributed over the outer surface for preventing it from slipping back.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

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In Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche		Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
US A	5059207	22-10-91	keine - none - rien	
EP A1	216538	01-04-87	GB A0 8522182	09-10-85
			GB A1 2179967	18-03-87
			GB B2 2179967	29-12-88
			JP A2 62101237	11-05-87
WD	86003396		keine - none - rien	

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